Minutes
Nutrient Science Advisors
Minutes
June 13, 2007, 240 Bessey Hall, ISU

The meeting started at 10:00

Participants included: Mike Burkart (ISU), Bill Ehm (DNR), Tom Wilton (DNR), John Olson (DNR), Pete Weyer (UIOWA), John Downing (ISU), Mike Birmingham (UHL), Mohammad Iqbal (UNI), Gary Welker (EPA), Ann Jacobs (EPA), Chris Jones (DMWW), and Mike Quist (ISU).

A presentation was made by Bill Ehm and John Olson that described DNR's view of nutrient water-quality standards.
A presentation was made by Ann Jacobs and Gary Welker that described EPA's interpretation of nutrient water-quality standards.
The important points from these presentations that will affect this group's discussions include:
-- Standards include: designated use; criteria to protect use; and non-degradation
-- Criteria include; concentration, magnitude or duration, and frequency
-- DNR defines 3 designated-use classes
        A- body-contact recreation
        B- aquatic life
        Raw water source of potable water
        Human Health—fish consumption

There was agreement with proposal for NSA to initially develop recommended criteria for Lakes under Class A uses. A four step process for accomplishing this was agreed to
1- Identify variables critical to protecting class A uses
2- Document relationships between each critical variable N and P
3- Quantify concentration, frequency, and duration of N and P that impair each use
4- Document the reasoning for each criterion

It was agreed that the second major task will be to develop "aquatic life" criteria for lakes under Class B (Lake or wetland) use.

1. Identify Variables
After brainstorming, it was noted from public surveys and lake measurements (JD) that people will spend money to use a lake with "good" values of the variables in Bold below.

Discussion was organized around the following variables:
1- Secchi disk depth
— Water clarity limited by suspended solids and algae
— 1 m or waist depth
— 0.7 used by Minn. in southern lakes and Iowa's perception of quality water
— Carlson's index useful to justify 1 m depth as eutrophic limit
— 3 m needed to maintain a littoral zone
— Tier of values—minimum and higher expectations
— Health relationships may be useful to justify 1 m or other value– Tie biological health to human expectations of swimmable conditions

— Relate secchi depth to: Chl-a
— Safety—diving accidents; drowning victims

2 — Chlorophyll concentrations
— Tied to algae biomass -- Visible Bloom frequency
— Swimming standards
— Nuisance threshold – use a probability of exceeding that threshold

3 — Cyanobacteria (biomass? faction of phytoplankton biomass?)
— Cyanotoxins--Microcystin—reported skin rash--- <1 micro g/L
— WHO criteria for recreation
— Cyanobacteria—15,000 cells per mil—Am Water Works
— Consensus that dominance (>50%) of total phytoplankton biomass is good place to start a criterion.

4— Phytoplankton (biomass?)
— Relate to chlorophyll—use criteria for both or select one that relates best to N and P

5— Nitrogen (total?)
— Develop relationship with all other variables

6— Total Phosphorus
— Develop relationship with all other variables

It was agreed that suspended solids would not be considered as a variable for nutrient criteria

Other variable mentioned
— Macrophytes – snails/swimmer's itch
— Bottom texture related to size—smaller= muddier
— Surface scum
— Bacteria
— Smell—hypoxia— what are the odor signals

2- Document relationships between each critical variable N and P
These will be developed as the indirect variables are identified and specific thresholds are agreed upon.

3- Quantify concentration, frequency, and duration of N and P that impair each use
It was proposed that we use a probability approach to combine the three elements of numerical criteria (concentration, duration, and frequency). This would require three steps
1- Determine threshold above (or below) which the use would not be protected.
2- Determine the relationship to N and/or P
3- Use cumulative frequency curves to define the probability of meeting and exceeding the threshold

The aquatic life designated use (3 B(LW) was discussed, specifically:
— Suggestions for subdividing the class and setting criteria were discussed as well as establishing a template for classification. Subdividing based on lake size, depth, etc (morphometry) was not met with enthusiasm.
— Suggestions for tiered criteria included:
        historical conditions—ieg pre-Columbian conditions; pre- 1971 or some other date of CWA; current conditions

aquatic life – a system being examined by EPA
— We need definition of "Lake"—includes wave action
— Impoundments -may be difficult to define and characterize their aquatic life
— Index of Biological Integrity (IBI) may be a useful tool to develop a tiered classification—this is a multi-metric index- related to ecological condition and structure- 0 (poor) 100 (excellent)—based on reference sites/conditions. Difficulty will be to find reference conditions in Iowa. It was not thought possible to using reference conditions in lakes similar to those in Iowa.
—good to bad lakes can be determined using a nutrient spectrum related to zooplankton, benthos, fish-small fish, perhaps others. This will be clarified in a future meeting.
— we need to investigate what other states doing with aquatic life standards.
— What historical analyses are available from Okoboji and other lakes?

A discussion on how criteria can be improved as more an different data become available.
— include science advisory group in triennial review
— establish a process to analyze monitoring data

We had a brief introduction to the Blog/Forum established for us by Jingyang Li of ISU. Participants in the Group will be accepted as members once they request access to the site.

Action Items include:
John Olson—Find reference to 0.7 secchi depth used by Minn. in southern lakes
Muhammed Iqbal --Find information to use Carlson's index useful to justify 1 m depth.
Tom Wilton (and Ed Bottei?) – Find information on health and safety relationships to transparency that may be useful to justify 1 m or other value of secchi depth.
John Downing – Show relationship between secchi depth and Ch in Iowa lakes.
Show how chlorophyll is tied to algae biomass in the context of visible bloom frequency.
Develop a Chl nuisance threshold using the "probability of exceeding" concept with John Olson.
John Olson – Obtain information on Chl and swimming standards.
Develop a Chl nuisance threshold using the "probability of exceeding" concept with John Downing
John Olson – Find and post the WHO document identifying cyanotoxin/Cyanobacteria limits.
Chris Jones – Find reference to American Water Works Assn. criteria of 15,000 cells per mil.
– Find information on N and P relationships to harmful bacteria with Pete Weyer.
– What are the odor signals and how are they related to hypoxia? (with Mike Quist)
Joe Larsheid – Find information about how macrophytes are related to snails/swimmer's itch.

Pete Weyer – Find information on N and P relationships to harmful bacteria with Chris Jones.
Mike Quist – What are the odor signals and how are they related to hypoxia? (with Chris Jones)